

Straw Value Add Committee

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Final Project Progress Narrative

**Reporting Activity for the Period
12-1-04 to 11-1-06**

Brief Summarization of Project

The Straw Value Add Committee (SVAC) has clearly stated from the commencement of this project in 2003 that the ultimate goal was to facilitate the construction of a biorefinery in southeastern Idaho. Our goal today remains the same. As one could expect in any newly emerging industry, time lines continually stretch longer than expected, and the pathway forward towards one's ultimate goal is by necessity variable. Such has been the case with the SVAC, as our vision of a producer owned straw assembly enterprise today appears to be out-of-synch with the evolving vision of our most likely customer, Iogen Corporation. Never-the-less, Iogen remains committed to being the industry leader in cellulosic ethanol, and Iogen continues to publicly state that Idaho is their most preferred site for a first plant. We believe the work done by the SVAC, work that was made possible by the USDA Value Added Grant, has contributed significantly to the forward momentum of the general cellulosic industry, and towards the eventual construction of a plant in the southeastern Idaho region.

Our work was organized around 3 specific goals:

1. Assess the feasibility of a distributed (i.e., on or near the farm versus doing the preprocessing value-add step at the centralized biorefinery location) straw grinding system that will powder various collected straw formats.
2. Assess the feasibility of grower and custom harvesters adopting and/or returning to harvesting, handling, and collection technologies that do not require baling to reduce overall straw assembly costs and increase bulk handling efficiencies for such large straw quantities.
3. Develop a comprehensive business plan, including the organizational structure and contracting, for a producer owned straw assembly enterprise.

Farmers stay focused on biofuel production

By Julie Pence, Ag Weekly correspondent
Monday, October 31, 2005 2:03 PM CST

RUPERT, Idaho -- One thing Illinois farmer Leon Corzine has learned is that not only does it pay to grow corn and soybeans for biodiesel and ethanol but recent high fuel prices have made it smart to use biofuels on the farm, too.

As a past president of the National Corn Growers Association, Corzine said 11 percent of the fuel he puts into his tractors and trucks these days is biodiesel -- an oil extracted from the seeds of plants like soybeans, combined with methanol and a catalyst.

States and farmers throughout the Midwest have promoted a biofuel economy for years with 91 biodiesel and ethanol plants already up and running and 15 in the planning stages, he said.

And now Idaho stands a pretty good chance of getting in on the biofuel movement with the Canadian-based company IOGEN and an eastern-Idaho coalition of farmers pushing for an Idaho Falls plant. The Idaho approach, however, is to be based on converting biomass -- left-over straw -- into ethanol, instead of relying on actual food sources for manufacturing biofuels.

"The big news on that, of course, is that Sen. (Larry Craig was able to get provisions in the energy bill (passed in July), which provides for building a plant in Idaho," said Duane Grant, a Rupert farmer organizing farmers who want to provide straw for IOGEN.

Travis Jones, who oversees agricultural issues for Craig in Washington, D.C., said Craig specifically worked toward getting the language for loan guarantees of up to \$250 million each for three plants so that one could be built in Idaho.

"So now Sen. Craig's mission is to help IOGEN and the D.O.E. implement the program," Jones said.

The farmers contracted with an engineering firm to complete a study to show IOGEN Idaho has what it takes to provide the plant with enough cellulose to make the plant viable, Grant said.

"We are just finishing the work to show it is feasible that we can actually harvest enough straw and get it delivered within the price parameters," he said.

Grant said he expects the study to be released to the public in December. In March, Grant was quoted in Ag Weekly as having said the contracts with IOGEN could double income for small grains.

The energy bill establishes a renewable-fuels standard requiring the use of 7.5 billion gallons of renewable fuel in gasoline by 2012. But even without the incentive, Corzine said biofuels are simply the wave of the future. Proof of that comes from the nation's recent experience with Hurricane Katrina, which proved a centralized fuel supply isn't smart, he said.

This final activity report covers an extended period of time. At the conclusion of our previous activity report, a long summer of field work had just been completed. Milestones included completion of the assessment of 3 different harvest,

transportation and storage systems, assessment of numerous configurations of mobile and stationary grind systems, and the commencement of analysis of data.

This period will cover the reporting of analysis of the harvest systems, conversion of Idaho straw to ethanol, creation of an Excel based Feedstock Supply Model, and drafting of a Business Plan. Finally, the SVAC will offer it's opinion of the feasibility of locating a Cellulosic Biorefinery in southeastern Idaho.

Analysis of Harvest and Processing Systems

Following the completion of the harvest cycle, the first analysis that was completed was the analysis of the powdered straw. Our purpose was to determine if the powdered straw was ground sufficiently for the logen Pilot Plant conversion process. For comparison, logen provided a sample of straw which functioned optimally in their facility. Samples from the 2 powdered lots prepared by SVAC, as well as 2 additional samples of twice-ground material were submitted to Ag. Process Engineering Group, Dept. of Agr. & Bioresource Eng., University of Saskatchewan, Canada.

Result Summary - Grant4dFarms Samples Submitted for ASAE Particle Size Analysis

	Screen mm	Diagonal, mm	S-1	S-2	S-3	S-4	S-5
	19x19	26.9		0.0%	0.0%	0.0%	0.0%
	12.5x12.5	18		0.3%	0.3%	0.2%	0.3%
	6x6	8.98		0.3%	0.3%	0.4%	0.3%
	4x4	5.61		0.5%	0.9%	0.8%	1.1%
Mass Retained on Screen (%)	2x2	1.65		37.4%	33.0%	23.0%	34.6%
	Pan			61.6%	65.5%	75.6%	63.8%
Total Recov	(g)			380.00	345.00	488.00	370.00
	(%)			96.7	96.4	96.3	98.4
d _{gm}	Mm			1.21	1.12	0.92	1.16
S _{gm}	Mm			2.92	2.80	2.43	2.86

(1) IOGEN - Nondisclosure

(2) Lot 2

(3) Lot 3

4) Barley Straw, Re-Grind, 1/4"
Screen

5) Barley Straw, 1st-Grind, 1/4"
Screen

(Sample one results omitted to protect confidentiality of logen CBI)

logen reported that the size profile of the SVAC samples were either too large or inconsistent to allow optimal processing. Subsequently, the decision was made to regrind the material. Two semi loads of ground straw, together with additional "ton

bags” of ground straw, were transported to Seb’s Feed Mill in Mud Lake, Idaho, for further processing. After re-processing, the material met logen specifications.

The next objective of the SVAC was to demonstrate that powdered straw could be transported in bulk semi trailers, and would unload in a flowable manner after long distance transportation. Scott Jackson Trucking of Jerome, Idaho, was contracted to haul 2 loads of powdered straw to logen’s Ottawa Pilot Facility. Utilizing the bulk trailer supplied by Trinity Trailer Manufacturing of Boise, Idaho, two loads were successfully transported to and unloaded in Ottawa. The product exhibited a bulk density when loaded in the truck bed of 26.23 lbs/ft³. No significant negative issues were observed in the condition, transportability, or ultimate flowability of the product.

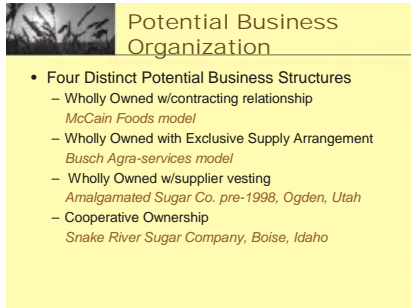
logen, using a proprietary process, converted the powdered straw into sugars, which were then fermented to ethanol. logen reported no significant negative issues with the Idaho origin powdered straw.

Upon successfully completion of the straw-to-ethanol process, the SVAC considers that **Goal # 1** has been met. Extensive detail regarding the decision process, conclusions, and effect of various systems on straw delivery cost can be examined by looking at the report entitled “Feasibility of a Producer Owned Ground-Straw Feedstock Supply System for Bioethanol and Other Products” (Report), as well as utilizing the Excel based Feed Stock Model (Model).

An integral part of our feasibility study was to determine if current systems available for harvest of straw are optimal in terms of capacity and efficiency, or if alternate systems could offer significant improvements. Post harvest analysis of various harvesting systems concluded that, in general, the large bale (4’X4’X8’ “ton bale”) format offered the greatest advantages currently. The system is widely used in the US, and has seen expanding use over the past 20 years. Significant specialized equipment has evolved that enable quick and efficient handling and transportation of the “ton” bales. However, based on the relative competitive position of bulk handling technologies vs. ton bale technology, it is the strong opinion of the SVAC that bulk systems will ultimately replace bale systems in an evolving cellulosic industry. Again, further information is available in the Report and Model. With the construction of the Model and analysis contained in the Report, the SVAC considers **Goal #2** to have been achieved.

Development of a comprehensive business plan, including the organizational structure and contracting, for a producer owned straw assembly enterprise was the final goal of the SVAC. This goal was a primary driver of the project. Agriculture Producers here in southern Idaho and across America believe that the institutional knowledge held by producers, the synergies realized by aligning priorities between Producers and Processors, and the need for long-term stability in feed stock supply all argue for strong connectivity between the parties. The SVAC believes Producer equity ownership, first in the straw harvesting and processing segment of the crop-to-ethanol chain, then extending to partial equity ownership in production and marketing facilities, is in the best interest of the entire group of cellulosic stakeholders.

The SVAC conducted discussions with logen regarding the most advantageous business structure on numerous occasions over the life of the project. Both parties were interested in discovering the best contracting model that would assure supply, control cost, and be sustainable. Both the SVAC and logen were cognizant of the potential market pricing power of producers should logen attempt to purchase the significant majority of available straw in a given area. Additionally, producers are acutely aware of the pricing power of a single buyer dominating in the market place. Both parties believe a synergistic approach is needed long term to limit risk, assure supply, and distribute rewards equitably.



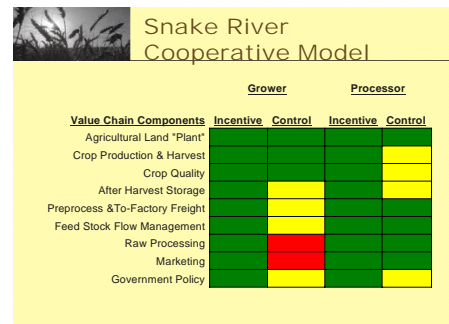
Potential Business Organization

- Four Distinct Potential Business Structures
 - Wholly Owned w/contracting relationship
McCain Foods model
 - Wholly Owned with Exclusive Supply Arrangement
Busch Agra-services model
 - Wholly Owned w/supplier vesting
Amalgamated Sugar Co. pre-1998, Ogden, Utah
 - Cooperative Ownership
Snake River Sugar Company, Boise, Idaho

Using established agriculture feed stock contracting models that either are or were recently used in agriculture product contracting in southern Idaho, the SVAC devised a matrix to determine which model most closely aligned the interests of the producer and the processor. Three of the models featured processors wholly owned by non-producer stockholders, and employing a variety of contracting scenarios to manage supply,

price, and overall risk. The fourth and final model features a Closed Cooperative structure, where equity ownership together with the right and obligation to supply feed stock rest with the producers. The SVAC formally presented the alternate concepts to logen in March, 2006.

Ultimately, logen decided that the “Wholly Owned with Contracting Relationship” best suited their need to control supply and managed risk. While the SVAC understands and respects logen’s current decision to retain control and ownership of the supply chain, the SVAC continues to believe that the long term viability of cellulosic ventures will be best met through establishment of producer equity in some or all of the ethanol production chain. Given that Goal #3 was to develop an organization structure to enable such equity vesting, the SVAC elected to construct a business model to accomplish that goal. The business model articulated in the “XX LLC , A Cereal Grain Straw Supply Company for the Bioethanol Industry” is the SVAC product intended to meet the objectives of Goal #3. Input for this business model was derived from a wide range of sources, including Northwest Farm Credit Services, the Twin Falls, Idaho accounting firm LeForge Rogers Evans and Braga, the Salt Lake City, Utah law firm Jones Waldo, from SVAC members, and from others. With the completion of the Business Plan, the SVAC believes that the objectives of **Goal #3** have been achieved.



Snake River Cooperative Model

	Grower		Processor	
Value Chain Components	Incentive	Control	Incentive	Control
Agricultural Land "Plant"				
Crop Production & Harvest				
Crop Quality				
After Harvest Storage				
Preprocess & To-Factory Freight				
Feed Stock Flow Management				
Raw Processing				
Marketing				
Government Policy				

Summary

In general, the project met the objectives of the Straw Value Add Committee. As previously stated, we believe each of our project goals have been achieved, and that the feasibility of harvesting, storing, preprocessing, and transporting straw as a cellulosic feed stock to an 800,000 ton annual consumption biorefinery has been clearly established. The project was completed within the grant budget allocated by the USDA VAPG program. Perhaps more importantly, proponents of the project believed sufficiently in the viability of cellulosic ethanol that they collectively contributed over \$120,000 of excess cost share to the project. The total project budget, including in-kind cost share, cash contributed by participants, and the \$450K USDA VAPG grant totaled \$1,036,383.

No insurmountable issues that could result in failure of the feedstock component of a cellulosic biorefinery were identified. However, several issues are notable, and failure to plan to accommodate these issues would likely prove significant for a biorefinery.

1. **Permitting:** A processing facility to handle the straw tonnage and associated by-products (dust, airborne organic particulates, etc.) as envisioned in this project has never been permitted in Idaho, or elsewhere in the US. The novelty of a cellulosic biorefinery may raise issue for regulators. Distributed grinding which occurs primarily in the countryside or farmer processing may minimize the impact of permitting.
2. **Narrow harvest window:** Successful year round operation of the plant will require 800,000 tons of straw to be harvested and stored in a short, 10-12 week window. Obtaining access to the equipment required to complete a timely harvest will be challenging both in terms of sheer quantity of equipment and in capitol investment required. Innovative arrangements between the processor and producers could minimize the significance of this issue.
3. **Alignment of priorities** between producers and processors: Both Producers and the Processor will be extremely codependent. The processor will have no other supply of feed stock, and the producer will have extremely limited

06/06/06 Iogen still waiting on `Uncle Sam` By: Bill Scott

June 6, 2006

Iogen Corporation has been looking at eastern Idaho for a couple of years now but the Canadian based company still isn't ready to break ground on an ethanol production plant using straw as its feed stock. Maurice Hladk says they're waiting to see if the US Department of Energy will come up with loan guarantees on the 300 million dollar project.

HLADK –“Several communities that could supply good quantities and reliable quantities of agricultural residue but the way we see the industry settling down pretty quickly is after the agricultural residue topped out by dedicated crops such as switch grass on the marginal farmlands.”

Eastern Idaho is Iogen's first choice for a plant if it's built in the US. If the Canadian government comes up with loan guarantees and other incentives first Iogen will probably build there. Iogen has commitments from hundreds of eastern Idaho grain growers willing to supply the plant with barley and wheat straw which in turn would be used to produce 60 million gallons of ethanol per year.

HLADK –“Our costs of production now are approaching that for corn grain ethanol, well under a \$1.50 a gallon.”

It could be October before the loan guarantee issue is settled. Iogen officials say they'd like to break ground on the ethanol plant in the fall of 2007.

Today's Idaho Ag News Bill Scott

market options. Enacting business policies on either side that disrupts the equitable distribution of returns to risk could lead to failure.

4. **Soil health:** Several agriculture producers expressed concern that removing straw from the field in Idaho's dry desert climate could lead to gradual long-term depletion of organic matter and certain plant nutrients. Additional research is needed to conclusively resolve this question.
5. **Capitol cost:** Although the cost-per-gallon to produce a gallon of cellulosic ethanol has been reported by Iogen to be competitive with starch-based ethanol, cellulosic ethanol is hampered by relatively high initial capitol cost for infrastructure. This relatively high capitol cost as compared to starch-based ethanol refinery has often been noted by observers. Iogen has reported an estimated capitol cost of approximately \$225 - \$250 million to construct a 60 million gallon annual production facility in Idaho, or a capitol cost of \$3.75 - \$4.15 per gallon. For comparison, current bids for construction of a green field starch-based biorefinery are about \$1.50 – \$2.00 per gallon annual capacity. Unless the market, government policy, or a combination of the two can somehow provide critical mass to get the first facility built, farmers will never have the opportunity to actually supply a facility.

It is the opinion of the Straw Value Add Committee that this project has clearly demonstrated the feasibility of supplying an 800,000 ton/annual straw biorefinery in southern Idaho. We believe the project has demonstrated the feedstock can be supplied in various formats to suit plant needs, and at a delivered cost within acceptable parameters as defined by the emerging cellulosic industry. The project has demonstrated that delivering powdered straw from a distributed grind system is feasible, and that innovation can further lower delivered pre-processed feedstock cost. And lastly, the SVAC believe the business model developed as a component of this project is a feasible vehicle to allow grower equity ownership of the straw harvest, processing, and delivery segments of the straw feedstock stream. The SVAC looks forward to working with the research community, industry, and government to realize the goal producing cellulosic derived ethanol in southern Idaho

The Straw Value Add Committee would like to express our gratitude to USDA Rural Development for providing the Value Added Producer Grant. Additionally, we would like to express our appreciation of all of our contractors, especially those who also contributed in-kind and cost share. Lastly but most importantly, the SVAC believes this project could not have been successfully completed without the strong assistance of the Idaho National Laboratory team.

Submitted by:

Duane R. Grant , SVAC Project Manager